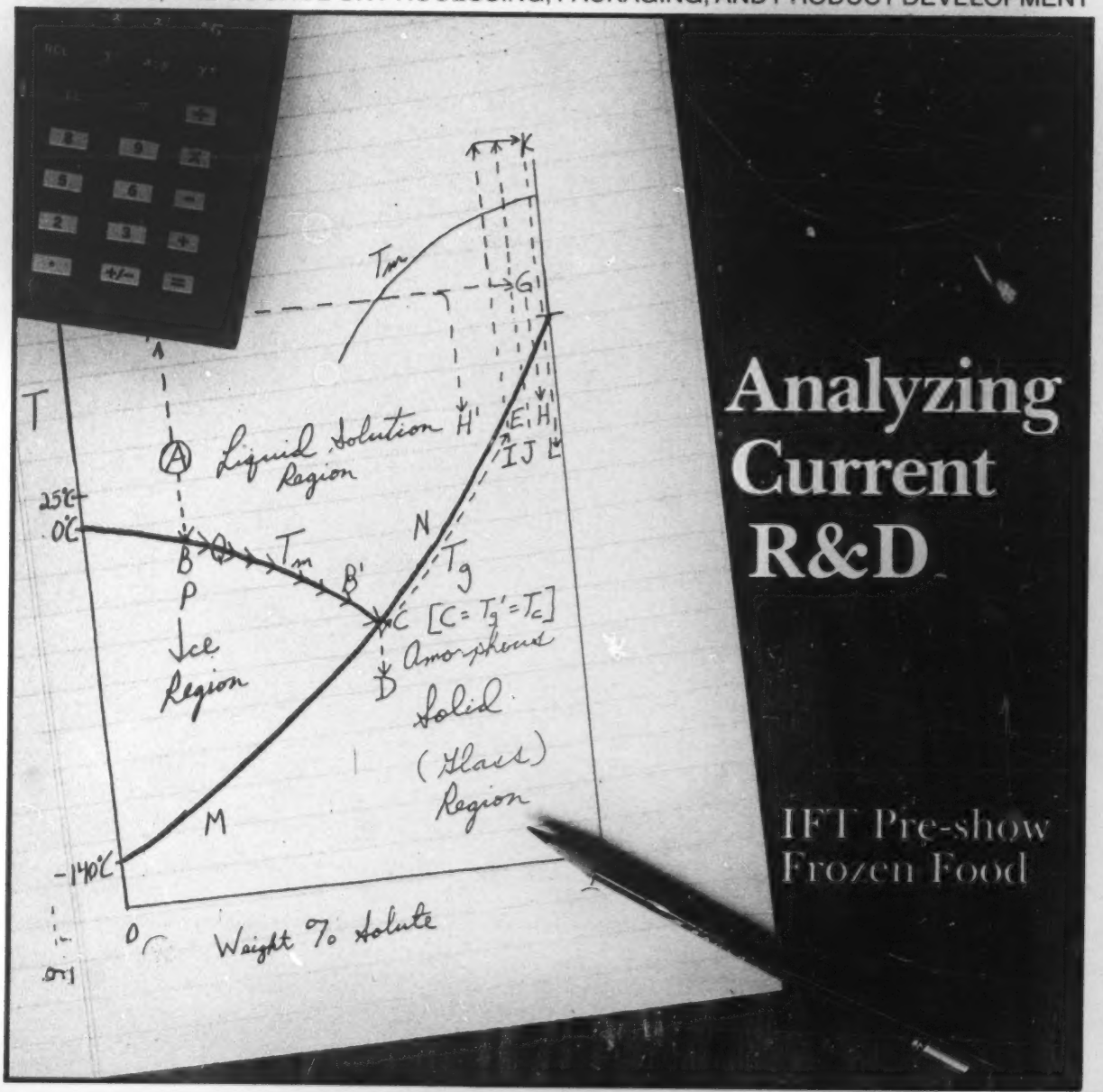
CHILTON'S

MAY 1987

C2150 -6
5/19/87

FOOD ENGINEERING

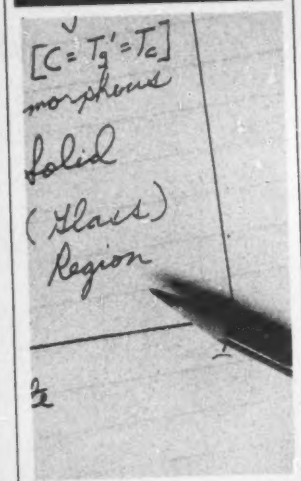
SINCE 1928, THE SOURCE ON PROCESSING, PACKAGING, AND PRODUCT DEVELOPMENT



Analyzing Current R&D

IFT Pre-show Frozen Food

FOOD ENGINEERING



COVER STORY

Success in today's marketplace requires a new relationship between top management and the research and development team. State diagram courtesy of Drs. Harry Levine and Louise Slade, Nabisco Brands, Inc.

Permission to photocopy for internal use or the internal use of specific clients is granted by Chilton Company for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $1.00 per copy of the article, plus 25¢ per page is paid directly to the CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to The Editor. (0193-323X/85 $1.00 + 25¢)

FOOD ENGINEERING® (ISSN 0193-323X) May 1987, Vol. 59, No. 5. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies, Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office ™Chilton Company, 1987. All rights reserved.

POSTMASTER: Send form 3579 to Food Engineering, Post Office Box Number 2035, Radnor, PA 19089.

News

14 Industry Report
This month's Report talks about the current Congressional probe into USDA poultry inspection and why sanitation and sanitation enforcement are majors concerns in the food industry; NFPA's request that food products be exempted from California's Proposition 65; Agriculture Secretary Lyng's commitment to research at USDA; and why control is the issue in regulating biotechnology.

Departments

9 Editorial
10 Calendar
14 Industry Report
35 Marketplace
45 Packaging
215 New In Print
217 People

CAJUN COOKING: PAGE 35

Features

91 State of R&D
New competitors have changed the nature of the food processing business. Innovation in research and development may be the only competitive edge.

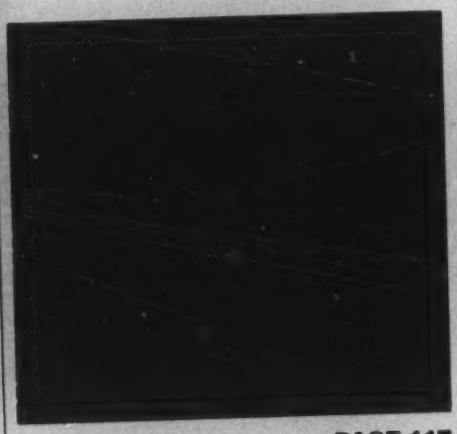
105 Micro CAD: In Use Basics
A new package, warehouse system or production line can be quickly designed using a PC and Micro CAD software.

117 Micro CAD: Resources
Easy-to-use CAD/CAM software is becoming an integral part of industrial design.

127 IFT Pre-show Report
IFT promises to be bigger than ever this year. Get a head start with *FE's* listing of exhibitors.

147 Frozen Foods
Obtaining shelf space in supermarket freezers is becoming more difficult.

155 Vegetable Proteins
This additive's future will be tied to changing consumer tastes and the demand for more healthful foods.



MICRO CAD: PAGE 117

CHILTON FOOD GROUP

Engineered Foods

56 Low Fat Foods
Flavors can be part of the solution in solving problems created by removing fats from food systems.

60 Polyglycerol Esters
The effectiveness of a new line of polygylcerol esters as emulsifiers in whipped toppings was evaluated.

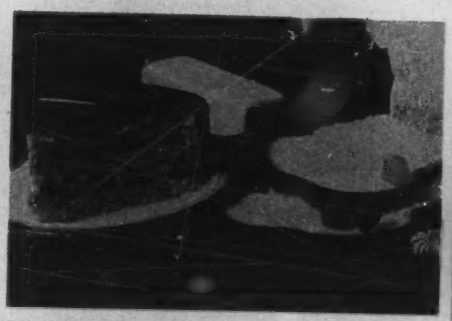
64 Omega-3
Are Omega-3 fatty acids a wonder ingredient or are they just another fish story?

70 Carbonated Milk
This drink combines refreshment with nutritional benefits.

73 Polymer Coatings
Understanding polymer film coatings could provide an important tool in improving or developing new foods.

76 Corn Flour
A patented process is used to produce corn flours with characteristics for specific end uses.

79 Dry HFCS
Pulse combustion drying plus encapsulation produces commercial quantities at a price equivalent to sucrose.



FOODS WITH PGEs: PAGE 60

New Equipment

187 Processing Equipment
199 Packaging Equipment
204 Sanitation & Maintenance
209 Instruments/QC

From the Field

163 Swiss vacuum band drying process succeeds in first American use.
166 New systems contain dust explosions, limit damage.
171 General Foods' equipment managed with bar-coding software.
173 Syrup producer boosts line speeds with computerized case coder.
174 New boiler-water treatments boost energy efficiency in food plants.
179 Powered rolling doors solve several passageway problems.
180 New applications are evolving for radio frequency drying.
182 Interfacing a PC to your existing laboratory equipment.
184 Fire forced processor to improve solids blending operation.

COMPUTERIZED CODER: PAGE 173

Special Emphasis

VEGETABLE PROTEIN USE SHIFTS GEARS

The emphasis in the vegetable protein market has shifted radically in the past few years from nutrition to function.

Pages 155 to 162

Food & beverage imports up 10.4%: A growing problem for America

Product	(million lbs.) 1985	1986	% Change
Confectionery (except chocolate)	755.0	851.2	+12.7
Chocolate (sweetened candy)	196.1	195.5	- 0.3
Cheese, all kinds	298.0	281.3	- 5.6
Pasta (macaroni/noodles)	185.0	190.7	+ 3.1
Breakfast cereals	34.4	35.5	+ 3.2
Fruit jams/jellies/marmalades	82.2	99.1	+20.6
Biscuits/cakes/breads	319.7	355.5	+11.2
Meats, all kinds	2519.4	2561.8	+ 1.7
Fish, all kinds	2632.3	2811.2	+ 6.8
Fruits & nuts (fresh/dry)	8634.2	8745.8	+ 1.3
Vegetables (frozen/fresh/dry)	2824.9	3009.7	+ 6.5
Coffee (crude/roasted/ground)	2505.5	2611.6	+ 4.2
Tea (crude/prepared)	175.1	198.6	+13.4
Fruit juices (mil. gal.)	755.4	1032.0	+36.6
Mineral waters (mil. gal.)	29.8	30.8	+ 3.4
Wines/champagne (mil. gal.)	134.1	102.3	-23.7
Beer/ale/stout (mil. gal.)	246.3	274.8	+11.6
Distilled spirits (mil. gal.)	122.3	106.4	-13.0

Most imported food categories showed gains in 1986 over 1985, with fruit juices, jams/jellies and non-chocolate confectionery products leading the way. Wines and distilled spirits were the only significant drops.

According to figures recently released by the U.S. Department of Commerce, slightly over $23 billion worth of food and beverage products were imported into the U.S. in 1986. This is an increase of 10.4% over the $20.93 billion imported in 1985. These dollar amounts reflect customs import values for all foodstuffs (crude and prepared), excluding live animals and feed stuffs for live animals.

A list of specific categories, (see accompanying chart), shows some interesting changes in the past year. Jams/jellies and the non-chocolate confectionery categories were up sharply, reflecting a world sugar price of about one-third the U.S. price, according to the National Confectioners Association. Due to increased apple juice imports, fruit juices showed a significant gain. Wine imports were down sharply, which the California-based Wine Institute attributes the decline to the lower U.S. dollar making imported wines more expensive. Beer imports were up, reflecting increased domestic sales. Pasta imports were up slightly in spite of high retaliatory import duties which were in effect for eight months in 1986.

Foreign competition

There is growing concern around the industry about foreign competition. Since the early 1970's, food imports have tripled. American consumer demands for quality and convenience have opened the door to imported value-added products.

Pointing to the 12.5% market share in the prepared soup segment that Ramen noodles has achieved Herbert Baum, president of Campbell U.S.A., says that the Japanese are a growing threat to the American food industry. Baum says that American processors need to pre-empt the Japanese by introducing innovative new products and packages while keeping costs down. Baum suggests extending product lines and improving existing brands as a method.

Foreign successes in new technological areas, such as aseptics and controlled atmosphere packaging, allows them to bring experience in these techniques to the U.S. marketplace. These technologies are specifically applicable to value-added products. The Japanese and Europeans have leaped ahead of the U.S. in technological developments because of their willingness to bring new technology to the marketplace. Faced with high long-term research costs and lengthy government approval processes, U.S. research tends to be applied, rather than basic, geared to short-term market victories, rather than long-term product alternatives.

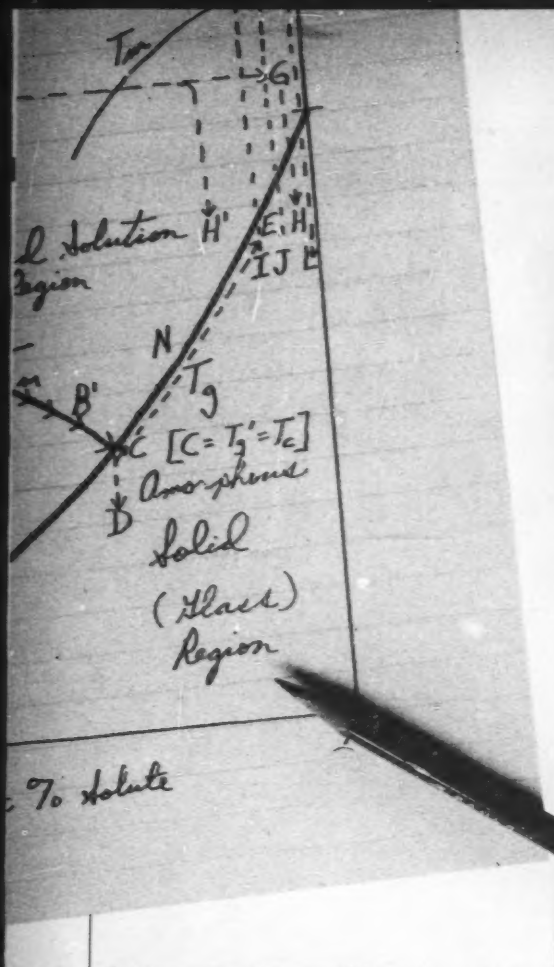
Quality of imported foods?

Meanwhile, the FDA is concerned about the quality of imported foods. At the National Food Policy Conference held in Washington, FDA Commissioner Frank Young stated, "I am very concerned about the quality of some of our imported foods. We have to ensure—as much as we can—that imported food really has the same degree of safety as domestic. I can tell you that's not true now." In the past, raw materials were brought into the country and the food was processed here with FDA inspectors providing a "good layer of safety" via in-plant inspections. Today, FDA inspectors can check at most, 9% of the estimated 1.4 million entries per year.

Taken together, continued growth of food imports, foreign concentration on value-added products via application of high technology, and FDA concerns over quality of imported food products add up to a growing problem for the American food industry.

Food consultants to present survey results

During the IFT Expo in Las Vegas, on Wednesday, June 17, at 10:00 a.m., *Prevention* Magazine and the Rodale Food Consultants will hold a news conference featuring the results from the 1987 Prevention Index. This is an annual survey of the nation's health habits conducted for Rodale Press by Louis Harris & Associates. This year's survey includes information on high-fiber foods, low cholesterol/low fat foods and low calorie foods.



STATE OF R&D

R&D: ENTERING AN ERA OF CHALLENGE

New competitors have changed the nature of the food processing business. It is research and development that holds the key to answering their challenge.

In a new era of competitiveness – not simply among U.S. food processors themselves, but with foreign competition, institutional markets and in-store food merchandising – do U.S. food processors have enough of a commitment to research and development?

The name of the game in today's marketplace is convenience. In a speech given at the FoodPlas Conference in Orlando, Herbert Baum, president of Campbell's Soup stressed that today's consumer wants convenience, quality and safety, but most of all, convenience. And consumers are willing to pay for this convenience. The consumer wants to spend as little time as possible in meal preparation, and so will spend a little more money for a restaurant-prepared meal, or spend a little more money for a take-out prepared meal, or spend a little more money for a store-bought meal requiring little or no preparation.

This all translates into a ready market for more value-added products. And, let's face it, value-added is where the profits are. This is why foreign companies have seized the opportunity presented by new processing and packaging technologies to grab an increasing share of the American market. For the first time, the U.S. has become a net importer of processed food products. (See *FE* Jan. '87 p. 76, "Grappling with a Global Economy.")

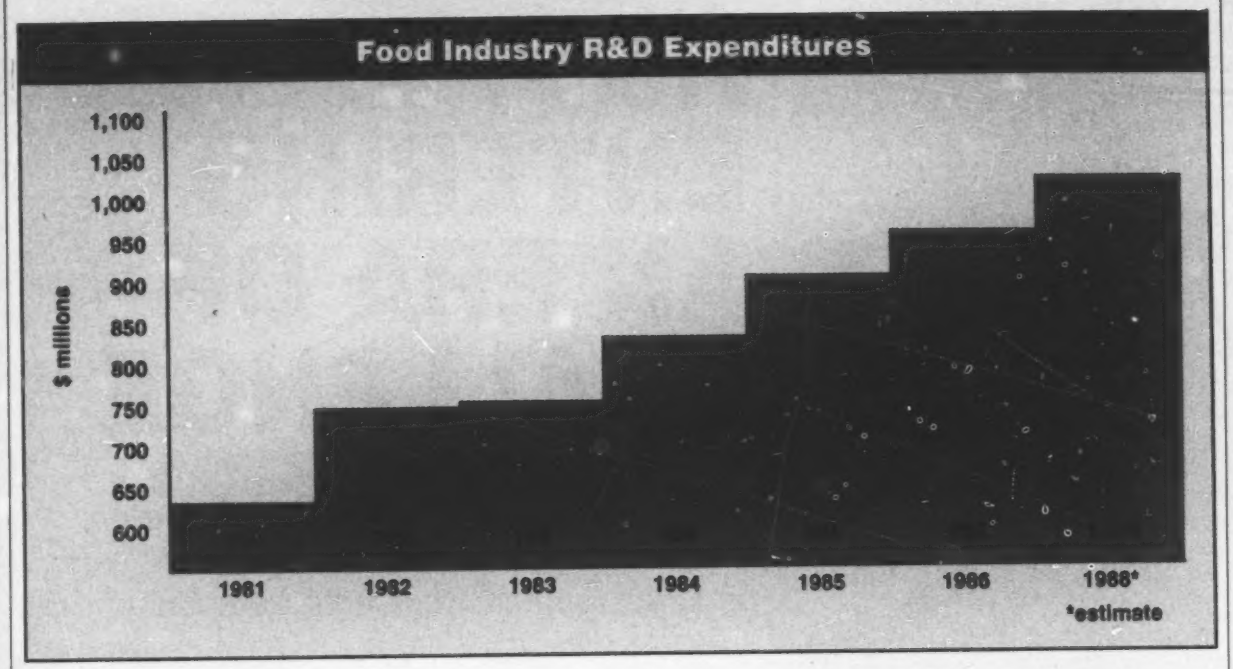
This is why restaurants are exploiting the possibilities presented by controlled atmosphere techniques to batch prepare their high quality meals and sell them in other venues. And indeed, restaurants/institutions have captured a whopping 47% of the consumer food dollar. This is why supermarkets themselves have become food preparation centers with expanded delis that include numerous items for take-out, offering everything from sliced bologna to prepared shrimp and fried chicken.

Where does Research and Development fit in? It is through R&D efforts that new products and techniques arise.

According to Al Clausi, senior vice president and chief research officer for General Foods, research and development efforts are aimed at freshness, quality, naturalness, nutrition, packaging and segmentation. Those are the top priorities that are being reflected in today's marketplace and by today's product development. "Different seg-

(Continued on page 92)

WILLIAM C. DRENNAN
Senior Editor



While budgets have risen steadily over the years, less than 1% of sales is generally allocated for research and development by food manufacturers.

ments of people want products tailored to their interest," said Clausi. "And they're willing to pay the price for it."

The product is no longer driving the market... the market is driving the product. Production-driven American food companies who are offering a good product, trying to compete on a cost basis are slowly being left behind. The rules of the marketplace are changing. The competition is as much or more with the restaurant/take-out business as with other domestic food companies—and as much with foreign competitors as with domestic ones.

The drive for market-driven products is reflected in private laboratories, such as the NFPA National Food Labs (NFL) in Dublin, California, which play an important role in supplementing applied research. According to NFL President David Holmes, "The kinds of work we do at National Food Labs are really driven by short term marketing. Larger food corporations have their own basic research centers doing long term research. When they get an overflow in an area, they send out for consultants like ourselves to give them a hand and it's always short term. They define projects very specifically with a definite time frame to keep costs in control."

General Foods does basic research and a lot of applied research. "There's always a lot of applied research going on," said Clausi. "Some of our research is contracted out, but that's really a minor portion."

Impact of mergers on R&D

The emergence of the conglomerate as a result of merger activity has had a profound effect on R&D. Although acquiring firms may be half a struggle, dealing with the debt service required with a multibillion dollar acquisition, it is possible that the acquired companies may find themselves with infusions of technical funds and talent. For some companies, mergers could provide the opportunity to revitalize technical programs that have stagnated due to lack of funds. While details vary across the industry, the most dramatic shift is the increased emphasis on new product development, marketing research, packaging and labeling, as a result of primary objectives being focused on short term financial performance. Expenditures on more basic research probably constitute a declining percentage of R&D budgets as the bulk of expenditures tends to be more sharply focused on immediate problems. In the long run, this trend may prove costly. Unique new competitive products will increasingly require basic research information from the biotechnology fields which could hold the key to new and less expensive production techniques.

With research and development and technology being increasingly integrated with marketing and sales in larger corporations, new products are likely to be more market-driven. R&D will be drawn closer to top management via centralized planning. Fa-

vorable budgets for R&D are likely as long as the research output is clearly valuable to the financial performance oriented conglomerate. Historically, larger companies spend larger percentages of sales on R&D. If this trend continues, the emerging giant conglomerates should fuel expanding nationwide R&D programs.

With mergers involving conglomerates there are opportunities for in-house collaboration on joint research efforts now frequently performed between staffs of food processors and various suppliers to solve specific technical problems. Public and private university research will continue to fill an important niche, particularly in supplying much of the fundamental research on which applications can be based.

Al Clausi of General Foods thinks that rather than dampening R&D efforts, mergers are helping them. As far as basic and applied across the industry, Clausi's impression is that considering the concentration in larger companies, there is *more* basic research going on amongst his competitors than before.

"But it's going to be a while before that result is evidenced in the marketplace," said Clausi. "And it's going to require a change of mentality on the part of management of some food conglomerates before results get used." Clausi does not see mergers themselves as an anathema to research. "I think that the only mergers that are a problem for research is when these raiders get involved. They only want to turn the business over to someone else to run it at a profit for them. They cut research, trim overhead."

Research needs

What research programs are most important? The Institute of Food Technologists has attempted to identify the most pressing research needs through the 1990's. Improved productivity in food processing, increased knowledge of nutrition and enhanced safety of foods were considered primary research targets.

Within these parameters, the IFT identified the following as research priorities:

•1. Developing innovative technologies, especially through biotechnology, sensors and robotic controls, as a means of improving food processing systems. These innovations should aim to assure cost reductions, decrease waste losses and provide a better technical capability to enhance the U.S. position in international trade. Designating these as top priorities derives from the need to preserve current markets, enhance nutrition and health, strengthen future regulatory positions and foster exports, as well as tap the applied research potential of available science.

•2. Developing technologies to improve agricultural and food products. Research combining genetic engineering and plant/animal husbandry may permit quality improvements in both the palatability and nutritive values of foods. Research is needed to discern the factors which motivate people in food selection. Linked with this is need to develop knowledge of the effects of certain food components on specific physical and mental functions.

Among the benefits expected from this research is a clarification of the effects of the constituents of foods on selected groups of people, for example; individuals with allergic reactions.

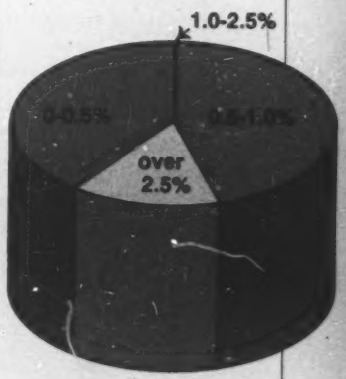
•3. Increasing the understanding of the physical, chemical and biological properties of food. There is a need for a long-term strengthening of the food industry's scientific base—specifically, an expansion of basic research which would make it possible to control the properties of materials in process as well as those of finished foods. Comprehensive understanding of the properties and structures of food materials could provide the processor with a potential catalog of properties that can be transformed into both food values and controllable variables. This, in turn, could lead to both increased productivity and the manufacture of better food products.

•4. Developing innovative analytical procedures that are rapid, nondestructive, simple, continuous/automated, on-line and inexpensive. Beyond achieving speed and accuracy, improved analytical methods would permit more effective nutrition intervention by controlling nutritional variances during processing. Research to develop improved analytical methods should also be directed to discovering means to extend food safety practices to biotechnology through characterization and evaluation of newly installed genetic engineering practices. New analytical tools are also needed to certify the effectiveness of detoxification techniques.

•5. Understanding the mechanisms for controlling biological activity to enhance food safety. Research is needed to improve the knowledge of actual exposure and true risk to show the real (as opposed to hypothesized) health threat from food components. Investigations which link enzymology to food composition should lead to improved

(Continued on page 95)

What is your R&D budget as a percent of sales?



More than three-fourths of our survey respondents said that their companies spent one percent of sales or less on R&D.

foods, better yields and safer foods. Research directed at reduced wastes and the conservation of process materials stem from environmental concerns. Expanded research on biosynthesis of preservatives and flavorants could result in useful products, broadening the potential of genetic engineering within the food industry.

•6. Obtaining and evaluating critical data related to health/nutrition and safety. Various factors influence the food choices of consumers. These can be translated into important production and marketing decisions within the industry. Consumer decisions, along with general food and nutrition knowledge, can have a substantial impact on the nation's health status in the long term. Research and interpretive studies are needed to clarify the role of food components in health and to measure risks to individuals with diet-related diseases.

The IFT has called for increased investment in food science which would help reduce the negative impact of food imports on the balance of trade, while enhancing the opportunity for exports.

Foreign competition

The U.S. has become a net importer of processed foods. Why has this happened? Are foreign companies outperforming the U.S. in areas of basic research?

Mr. Clausi's feelings about foreign competition are comparable to those voiced about other industries feeling pressure from foreign invasions. "It's not so much that they're doing more basic research than we are," said Clausi. "Or for that matter even more applied than we are, but they're using it in the marketplace more aggressively than we are. We have in this country far more capacity and capability to act in the marketplace than we seem to be willing to do. My concern is that we'll be seeing products and technologies that are 5 or 10 years old in this country coming in via foreign manufacturers... not because they invented it necessarily, but because they're using it."

Why is this happening? It may be because foreign companies are hungry for new business and not worried as we are about offending the old. Companies with big products that are generating a lot of sales, even though those sales may be decreasing, are preoccupied with maintaining market shares, rather than nurturing new competing products alongside of it. Clausi likened the situation to being preoccupied with a slow-moving elephant, while ignoring a speedy, growing mouse. "Trying to get that elephant's momentum up can be a Herculean task."

"The one area where I would say foreign aggressiveness is already very evident is in packaging," said Clausi. "They are country miles ahead of us in some of their innovative packaging. And it's not that they know more than we do, they're just using it."

Use of private labs

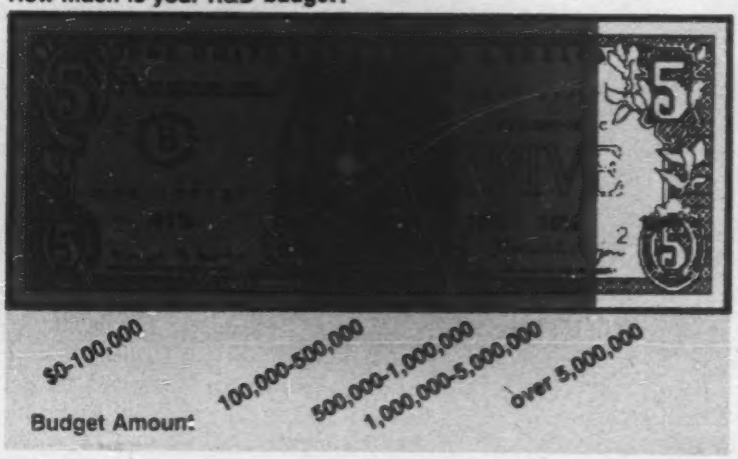
The National Food Laboratory is primarily used for applied research on a confidential basis. Unlike universities private labs have stable staffs and can limit access. "We are a confidential and very proprietary lab," said Holmes. "And we are sought out because of that reason."

When asked about research trends, Dr. Holmes said he sees a trend in the food industry towards fresher, refrigerated and frozen foods. "All kinds of work is being done on new types of packages... do they make the product look, appeal and taste better?" Food safety is another issue addressed by NFL—both in packages and in the food itself. Foods are in the marketplace in different distribution channels that weren't there before. "They're putting dairy products in plastic wrappers. There is a lot of reformulation going on to be compatible with microwave, retorts and aseptics." NFL does a lot of work with the microbiological safety of all of the above, e.g. a company will ask the NFL to evaluate a new package from the microbiological standpoint, or question whether changing the atmosphere could cause a worry about staff, salmonella or botulism? NFL will challenge the system by physical inoculation and so forth."

Holmes said that over the long haul there

(Continued on page 96)

How much is your R&D budget?



While 62% of our survey respondents spent less than $500,000 on R&D, a healthy 18% budgeted over $5 million.

←Insert 61 or see FEM, p. 148

has been quite a bit of trimming back of R&D. He says that acquisitions and divestitures have brought this about. When asked about foreign competition, Holmes said that, "Foreigners seem to stimulate us in new products. We seem to be inhibited by our regulatory system in the U.S. NFL receives projects for getting systems or products through the regulations."

Response to consumers

The primary function of research in food companies is for new product development. In the search for larger market share, new product introductions are proceeding at a frenzied pace. In 1986 alone, there were 3,389 new product introductions in the U.S. (see *FE*, April p. 61). These new products are being offered primarily in response to consumer concerns and interests, including:

• Convenience. Microwave oven and toaster oven applications are growing ever larger. According to the latest SAMI figures, 60% of American households now have microwave ovens. Products designed for microwave cooking can require quite different formulations than for conventional cooking techniques.

The greatest reflection of consumer demand for convenience is in the area of packaging. Single-serving sizes, shelf stable packaging, aseptic processing and packaging, retortable flexible pouches and dual-ovenable containers are all direct responses to consumer demands for convenience.

• Freshness. Consumers are demanding freshness in their products. That is one reason they are turning to restaurants and "take-out" stores. The implications arising from this demand include shelf-life extensions for fresh foods, a closer-to-fresh processed foods approach, and closer-to-market food production and preparation. In response, the food industry is exploring improved thermal processing techniques and controlled atmosphere packaging and transportation to hold product freshness. The explosion of new refrigerated items (see *FE* April, p. 76) is also in response to a demand for freshness.

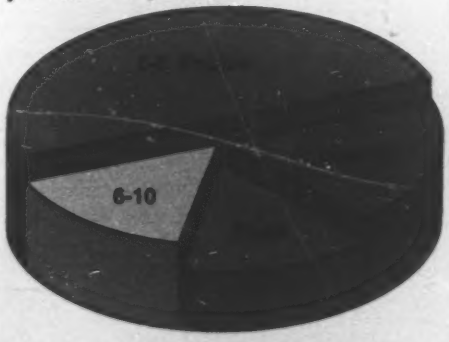
• Quality. Consumers are demanding and are willing to pay for higher perceived quality. This demand is focusing attention on improved flavoring systems, the use of natural colors and flavors and improved crispness in some microwaveable products. Work in flavor encapsulation and natural flavor production through tissue culture and fermentation are responses to this demand. As is work with susceptors in microwave packages to focus energy in places where crispness is desired.

•Safety. Food safety is a broad issue, encompassing formulation, processing and handling, all the way to packaging and in-store handling. Recent major incidences of *Listeria* and *Salmonella* involving 12 deaths in this country have focused attention on greater regulatory control which involves the development of improved testing procedures. In the packaging arena, 1,720 food tampering reports in 1986, (See *FE* Feb. p. 67) have forced companies to develop improved tamper evident containers.

•Nutrition and Health. Additives, fiber research and the use of physical instead of chemical preservation methods are responses to consumer interest in healthier products. Nutritional research into the areas of amino acids and fatty acids also addresses this issue.

• Value. Increased expenditures for out-of-home eating does not imply that consumers are not still value-conscious. Research into cost reduction, waste reduction, by-product utilization and reduced packaging costs are all aimed at giving consumers more value.

How many people staff your R&D Department?



Two-thirds of our responding companies have R&D staffs of 10 or fewer people. 18% reported over 20 people working on R&D.

Areas of opportunity in R&D

According to James J. Albrecht, vice president and general manager of McCormick-Stange Flavor Div., there are several key technological areas receiving the attention of R&D efforts.

• Biotechnology. This includes enzymology, protein engineering and fermentation technology. The production of natural flavors (and possibly natural colors) through fermentation and enzymatic techniques is just on the horizon.

• Packaging. Packaging systems for microwaveable products, aseptic packaging of particulate food products and controlled atmosphere packaging techniques are receiving a lot of attention.

• Fabricated Foods. Given the techniques used for surimi manufacture and the subsequent structured or fabricated seafood products involving the use of surimi, it is likely there will be a resurgence of work done on textured meat and poultry products using similar fabrication systems.

• Nutrition and Health. Consumers are looking for more than taste and convenience.

General Foods agrees with Albrecht's list. "We're very much involved in basic areas such as new preservation methods, biotechnology, nutrition and health, and sensory perception," said Clausi. "These are kind of underpinnings of research that you need for any successful food venture."

R for R&D success

According to National Food Processors Association President, Fernando Gumucio, who also serves as the President of Del Monte, U.S.A. as well as vice president of Nabisco Brands U.S.A., success in today's marketplace will require a new relationship between top management and R&D. Gumucio stressed that, "Within the new corporate structures which have evolved, the need for creativity and entrepreneurship has never been more pronounced, given the fiercely competitive nature of the industry."

In order to compete effectively with innovations from abroad, Gumucio says that fundamental changes must take place within the U.S. corporate structure as follows:

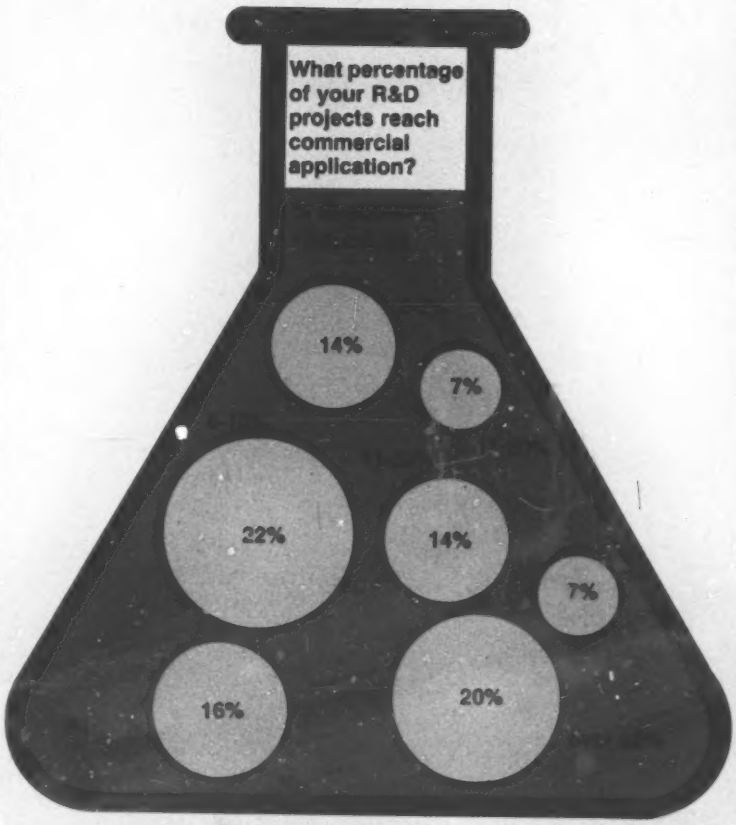
• There must be closer interaction between R&D and top management. Those in R&D must know the economics and strategies of the business. Top management must have a better appreciation of the company's R&D capabilities;

• All managers must become more tactical, placing more emphasis on "hands-on" experience and execution and paying a premium for real talent;

• Much more senior or experienced, focused people must become involved in brand management.

Making the picture more complicated is the increasingly fragmented consumer market. "There will be a constant ebb and flow in consumer desires and demands as the so-called baby-boomers hurtle toward their mid-life crises and beyond," said Gumucio. He added that meeting consumer and trade demands will "be like dancing through a mine field."

"Therefore, in an environment of 'company business' on one hand and a rapidly changing market on the other hand," concluded Gumucio, "here in America we have a need of the true entrepreneural spirit more than ever. The sheer joy of inventing, creating and the satisfaction of seeing your genius become a viable business is not a luxury—it will be a necessity."



14% of our respondents reported less than 5% of their projects reaching commercial application. 22% reported a 6-10% success rate. 7% claimed that 11-20% of their projects made it. Another 14% said 21-30% of their projects were successful. Another 7% reported a 31-40% rate of success. 16% claimed 41-50% reached the store shelves. And a full 20% said that 50% + of their projects reached commercial application.

R&D Survey

As part of this report, *Food Engineering* surveyed R&D leaders in the food industry. Questions were asked about R&D budgets, staff sizes, the effect of mergers on R&D efforts and about R&D commitments. The information gathered is presented in charts throughout this article.

It is interesting to note that in response to our question about "Commitment to R&D," respondees rated their own companies lowest, below U.S. commitment and foreign commitment. It is apparent that on the average, research and development managers feel that not enough research efforts are being made by U.S. food companies.

Some of the comments we received include:

> "R&D is in a general decline in the U.S. because of the length of time needed to develop a truly new product and the lack of lead time in the marketplace before it can be copied or duplicated."

(Continued on page 101)

"Cost consciousness has reduced R&D efforts in the U.S. due to their expense."

"U.S. food industry takes very little advantage of the vast technical knowledge available and like most U.S. businesses is run by financial people who refuse to believe that food R&D professionals have business sense."

"I think that American food companies are just now beginning to realize that they can no longer rest on their laurels and must compete on an international scale."

"R&D in the U.S. has been neglected. However, companies are now realizing the effectiveness of R&D, not only in developing new products in a laboratory, but as a support for sales. There is also a great deal of pressure on R&D staffs to produce products giving a competitive edge to their company.

"In the early 1980's, R&D was a 'me too' type of format with duplication of competitive products as the main focal point. This stagnates the development of new products. We have now moved into an era where creative R&D is used for the aforementioned competitive edge."

"Along with innovation, the food producers must be concerned with nutrition which was never seriously considered in the past."

"I feel that foreign R&D is currently moving in the areas surrounding the actual food product (i.e. packaging)."

"I think R&D is one of the major components of a growing and thriving company—one that can keep up with its competition. In general, I think R&D's status in the U.S. is increasing because of this. However, I think it has a way to go before most companies' stop thinking of it as a dollar burner."

"In some areas, U.S. R&D is 10 years behind Europe and Japan—packaging technology for example. U.S. R&D has been seriously underfunded the past 10-20 years because of the influence of financially-oriented CEO's who have trouble seeing be-

On a scale of 1 (low) to 5 (high), please rank the following: Your company's commitment to R&D; U.S. commitment to R&D; and Foreign commitment to R&D.

Respondents generally ranked their own companies lowest for "Commitment to R&D," slightly below the overall U.S. commitment and substantially below their perception of foreign commitment.

Effect of mergers

As described earlier, there has definitely been an effect of food industry consolidation on research and development. How do our survey respondents feel about it?

"In the short term, mergers result in people losing their jobs because of consolidation of R&D labs. Long term, there will probably be more jobs because of the stronger companies that result."

"Mergers have reduced creativity and rate of R&D."

"Mergers and conglomeration has reduced R&D for long range status of R&D in U.S. – stinks."

"Mergers, especially leveraged buyouts are detrimental to R&D. The payback becomes the overriding priority."

"Merger activity, depending on primary products causes reduction in to-

(Continued on page 102)

tal R&D personnel and decreased budgets (due to staff cutbacks). However, cross fertilization of retained employees and skills increases efficiency and provides for a greater percentage of 'hits.'"

"Merger activity has stifled R&D. The money is going to "earnings per share" to fend off the merger maniacs."

"I think mergers could help R&D dollarwise – more availability. They could also split up some good teams which scares me."

"Mergers have a negative effect. The tendency is to 'buy tech' rather than develop it."

"Friends in the industry who work for corporate giants usually find it difficult to maintain R&D programs for some time after a merger has taken place."

Wish lists

As always with our surveys, we asked our respondents for their "wish list." If suddenly given access to unlimited funding, what projects would they establish?

"Continuous agitating retort systems for glass"

"Application of robotics to food processing"

"Microwave processing of hard candy"

"A tasty, highly enriched bread product"

"Frozen entree product line for retail use."

"Commercialization of food irradiation."

"New techniques for preservation of food."

"Flavor additives such as cheese and caramel added to microwave popcorn."

"Improved packaging design for non-refrigerated, shelf stable cheese products."

"Radiation of fresh vegetable products."

"A full line of highest quality shelf-stable, dairy-based sauces, foods, etc."

"Food for space flight and into the 21st century."

"Computer application to flavor creation."

"In-depth study of causes of obesity and realistic means of prevention. Caloric intake and expenditure as currently preached cannot be the full answer."

"Determination, isolation and concentration of naturally occurring enzymes in meat that can be used for tenderization of less tender cuts."

"Effective alternative to frozen foods. Products with same quality and convenience but not frozen."

"I would seek to discover all that could be known about the effects of all-natural foods versus the 'processed' (and over-processed) versions, on the health of the consumer."

"Improvement in emulsion technology – automation to achieve uniformity in production and filling techniques."

Other survey results indicate that the bulk of companies have R&D staffs of 10 people or less, that most R&D projects never reach commercial application (although this does not mean that valuable information has not been gained), and that R&D budgets are generally one percent of sales or less (see accompanying charts.)

Time to act!

It is clear that now is a time of both challenge and opportunity for American research and development. Some companies are already responding with new products, new processes and new packages. We have the facilities and we have the talent. In answering the challenge, food processors will be able to seize the opportunity to not only defend their U.S. markets, but also launch global marketing campaigns of their own.

GETTING FROZEN FOODS TO CONSUMERS

While obtaining shelf space in supermarkets is becoming more difficult, nowhere is the problem more acute than in the freezer section. But the situation is not hopeless.

Supermarkets depend on sales volume for profitability since fierce competition is keeping gross profit margins low. In 1985, after-tax profit for the industry was 1.19 percent of each consumer dollar, reports the Food Marketing Institute (FMI).

The heavy dependence on sales volume for profitability is resulting in inventory "turns," or replacements that average about 15 per year, reports FMI. So supermarkets are being more cautious in giving shelf space to new products. And slow-moving foods are being removed from the shelves.

Hence, it more difficult for food processors to get and keep shelf space for their products. Frozen foods are especially susceptible to being pulled from the shelf, or not getting space in the first place.

A major reason for the limited freezer space is energy costs. Supermarket energy costs often exceed those for rent. Refrigeration alone accounts for the major portion of a food store's energy bill—anywhere from 55 to 60 percent, according to FMI. And refrigerators and freezers must operate at all times—even when a store is closed—to prevent perishables from spoiling.

An escalating number of new food introductions each year is not helping the situation. Although, there is some slowing of frozen food introductions, due in part to the great proliferation of new products. Marketing Intelligence Services reports 94 new frozen foods in the first quarter of 1987 versus 121 for the same period in 1986.

In spite of the cost to supermarkets to house frozen foods, it is an important area both in sales volume and profits. Frozen foods—available to the consumer in three categories: To be eaten frozen, thaw-and-serve, and heat-and-serve—account for an average of 10 percent of total food sales in the supermarket, according to the Eastern Frosted Foods Association (EFFA).

EFFA also reported that while profit per square foot of the entire supermarket is 1.28, it rises to an average of 8.61 for frozen food. And frozen foods led all food categories in increased sales for 1985, with a 5.5 percent rise (overall grocery sales were only up 4.7 percent, with most of that attributable to the increase of non-food items).

Annual sales of single frozen dishes—the frozen food department's largest product group—were $2.7 billion for 1986, continued EFFA. And new brands and line extensions of single frozen dishes were responsible for almost $450 million in sales, which is 16.5 percent or one in every six dollars spent—making the frozen food department one of the most innovative in supermarkets.

At the most recent National Frozen Food Convention, held last October in Las Vegas,

(Continued on page 148)

ANN E. PRZYBYLA
Technical Editor

Interstate Food Processing Corp. first introduced its Quality Farms LetterBites to food service markets. The product's uniqueness have increased acceptance.

Byron Allumbaugh, chairman and CEO for Ralph's Grocery Co., Compton, CA, addressed the importance of frozen foods. He pointed out that in Ralph's, frozen foods account for 13 percent of grocery sales and 15 percent of grocery profits.

Ralph's began increasing the size of frozen food departments in its new stores about six years ago. As a result, its giant supermarkets now have more than 400 sq. ft. devoted to frozen foods.

Process starts early

Getting a new product into the freezer begins long before a manufacturer's sales force calls on supermarket buyers. A number of people polled agreed that there are several essential steps to successfully marketing a new frozen food. These are:

1) Do your homework to identify a consumer need—preferably one that is not already filled.

2) Build quality into the product.

3) Support the introduction with effective advertising.

4) Several people added—pray.

The classic example of a successful new frozen food is Stouffer's Lean Cuisine. In 1971, Stouffer noticed through its restaurants that lighter foods were in vogue. The company then spent ten years developing a quality product that tasted good.

A spokesperson for Stouffer pointed that quality will always win out in the long haul and if someone is able to produce a quality product at a lower price, then all the better.

Recently, Dreyer's Grand Ice Cream of Oakland, CA, introduced Dreyer's Grand Light—a 93 percent fat free frozen dessert developed to taste like regular ice cream. The important steps in developing a new product were followed. A task force—comprised of people from R&D, manufacturing, marketing, and sales—was formed to identify a need not being filled. Initially, it was decided that the company develop some type of low calorie/low fat frozen dessert.

Consumer research was then conducted to more closely define the product. Next R&D was given the assignment to develop the product with good taste the main objective. Although, they tried to keep the calorie content at 100 calories per serving, with some flavors it was necessary to go to 120 calories to get a product with a taste that consumers rated as excellent.

Once the product was developed, advertising was produced and simulated test markets conducted. Although, the company was convinced it had a truly unique product which consumers wanted, it was amazed at how much space was given to Dreyer's Light without any space being taken from Dreyer's regular line of premium ice cream.

"Demand for Dreyer's Light is three to four times what we expected and we haven't even begun television advertising," explains Susan Schultz, product manager for Dreyer's Light. The product is currently available in six western states. With expanded distribution planned, the demand can be met.

A correct assessment of consumers' needs is critical to successful marketing of new products. Geo. A. Hormel & Co. evaluated the tremendous changes that the American family has gone through during the past decade and how these changes have affected their eating habits prior to introducing its New Traditions line—developed specifically for microwave preparation.

The first products to be introduced in the line were Broiled & Browned Sausages which made their debut last year. The most recent additions to the line are Pre-broiled and Browned, Microwave-ready Dinner Meats (boneless, center-cut pork chops; skinless boneless breast of chicken; and fillet of catfish).

Since this line of meats answers shortcomings of microwaves offering consumers a convenience not previously available, Hormel's sales force had no difficulty creating excitement for the product among supermarket buyers, explained Gary Esbeck of Hormel. "Traditions Pre-broiled and browned Dinner Meats are so different,

they draw attention." he continued.

Hormel began national roll out of New Traditions microwave-ready breakfast sandwiches last month. Other additions to the line will appear later this year.

Money...a necessary ingredient

Even with an exceptional new product that meets the criteria to be a winner, big money is necessary to launch it into distribution. Without this money—no matter how good a new product is—it will never become more than a speciality store item, explains Norman Schwartz, V.P. of Glacial Confections.

Schwartz speaks from experience. Glacial Confections, a Westport,CT-based company with 12 employees, recently introduced a new product which created a new category—Mousse du Jour frozen mousse. Based on a patented process, free water is bound in this product allowing it to be defrosted and refrozen without ice crystals forming.

Glacial Confections first needed to convince retailers that Mousse du Jour was indeed new and different from anything else available. But they also needed to have a program to generate consumers interest in this new category which included radio, TV, and print advertising. And that took big money.

Campbell USA President Herb Baum recently told an American Marketing Association conference on product introductions that a new product should be supported with a minimum of $15 million for marketing. This is a lot of money for a small company to come up with.

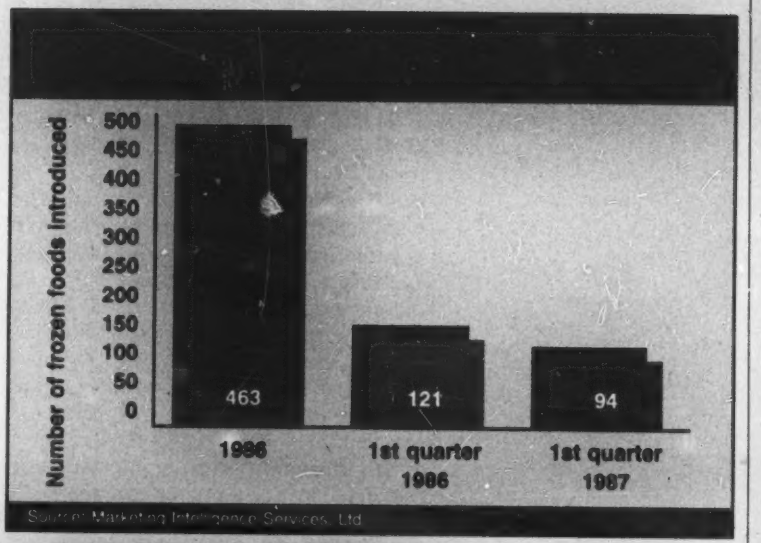
"You have to really believe in your product to invest this amount of money in it," said Schwartz. By obtaining investors to back Mousse du Jour, Glacial Confections did develop a major marketing program to support its product.

"We told retailers we were a small company but were willing to advertise as a large company," Schwartz continued.

This makes national introduction of a new product a long, uphill battle for small companies—especially when addressing the retail market. But some frozen food manufacturers are focusing in on food service and industrial markets.

D&K Frozen Foods, Walla Walla, WA, produces frozen vegetables for the industrial market. But they still need to keep up on current trends.

"We have ongoing programs to look for the kind of vegetables to be used in frozen entrees," states Gary Koehler, planning and purchasing manager for D&K. "Entree tailored vegetables have been a very fast growth area and we have been in the forefront because of our flexibility."



Above: Although fewer new frozen foods were introduced in the first quarter of 1986 than in the same period in 1985, freezer space for new frozen foods remains difficult to obtain.
Left: Dreyer's Grand Light obviously fills a consumer need since sales were three to four times predictions prior to television advertising.

Standard cuts of vegetables are dropping off, but the slack is being taken up by new types, explains Koehler. Appearance is currently an important consideration. Tiny, tender peas are now popular and edible pea pods are being sought.

Food service is another important area to frozen food manufacturers. For example, $19.8 billion of frozen foods, excluding ice cream was sold to the food service trade in 1986 as compared to $13.2 billion in 1985, reports EFFA. And Americans now spend 37 percent of their food dollar in restaurants, with 45 percent projected by the mid

(Continued on page 150)

1990s, EFFA continues. (Frozen foods account for most fish, chicken, meats, and vegetables used by restaurants).

Interstate Food Processing Corp. of Bosie, ID, decided to first introduce its Quality Farms LetterBites (patent pending) to food service markets. Although, limited freezer space of distributors is a problem in marketing frozen foods to food service customers.

LetterBites' uniqueness have helped in their acceptance. They are crispy, golden brown letters with a smooth potato interior. Currently used in school feeding programs, on children's menus in restaurants, and as finger food in bars, IFPC is now looking at retail markets.

Retail remains the ultimate market to capture. Before a new product is accepted by Stop & Shop Supermarket, Inc., a committee must approve it. Ed Dawe, frozen food buyer/merchandizer for Stop & Shop, listed the criteria by which a new food item is judged: Whether it's is a duplication; the product's sales potential; what the profitability will be; manufacturer's advertising program; whether the product fits a consumer need; if the product is in a growing category; and what introduction allowance (money offered to the retailer to handle the product) is offered.

Once a product is approved by Stop & Shop, it is given a slot at the warehouse and two cases are allocated per store. Promotions are then set up. New products are given six months and then reviewed to see if they meet the original requirements. Ones that don't are pulled from the shelf/freezer.

Categories and products are constantly reviewed at Stop & Shop. Based on these reviews, items are discontinued and categories are enlarged or decreased in size.

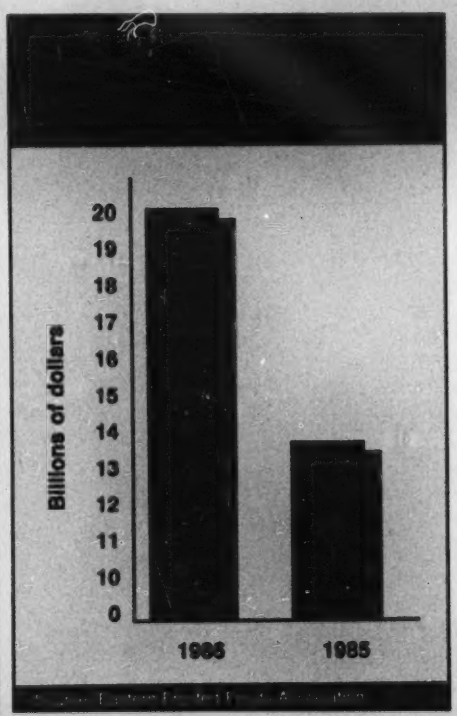
"We have many new categories in the freezer that didn't exist four or five years ago such as premium ice novelties, foods developed exclusively for microwave preparation, and toaster breakfast items. And since there is limited capacity in the frozen food section, existing items have to be discontinued to make room for new ones." Dawe said.

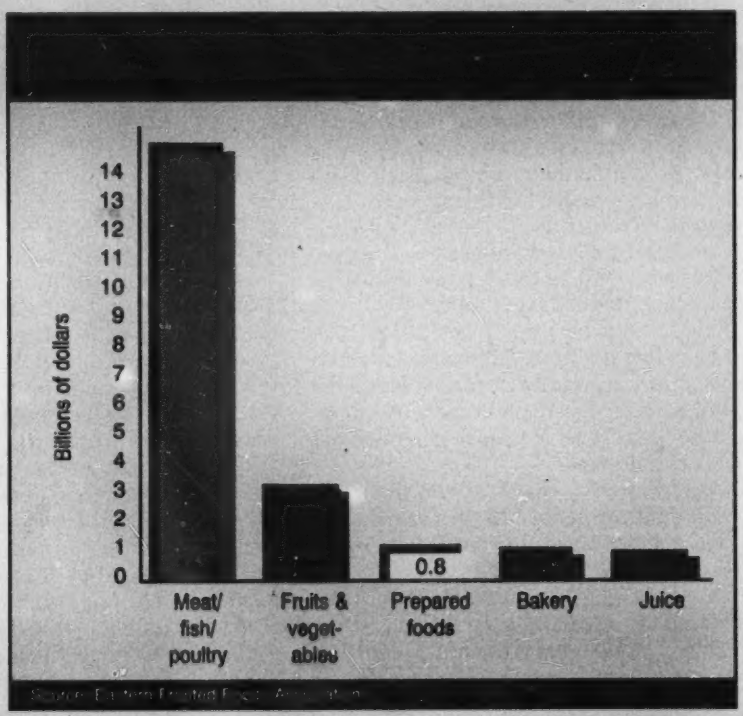
This makes it necessary for food manufacturers to continuously watch their existing lines in addition to developing marketing programs for new ones.

"We keep trying to create enough demand for our product line so retailers will feel they cannot discontinue any of our products to make room for others," explains Kelly Storms, marketing manager for Celantano Brothers Inc., Verona, NJ.

ConAgra Frozen Foods recently gave its Armour Dinner Classics—a frozen dinner line—a new look that includes new flavors, packaging, advertising, and a public relations campaign that emphasizes the quality and microwaveability of the dinners. This revamping was done as a result of consumer research showing interest in round plates

(Continued on page 152)





Insert 87 or see FEM, p. 169→

for premium frozen dinners.

Selection of the new packages involved examining 100 different designed and narrowing those to 12. The 12 designs were then reviewed with consumers in a series of 12 focus groups around the country.

Results of the consumers testing showed that 93 percent of people recognized the "new" Dinner Classics, compared with the industry norm of 80 percent. And 25 percent said they definitely would buy "new" Dinner Classics, compared with a 12 percent purchase intent for "old" Dinner Classics and 14 percent for major competitors in the premium frozen food line, reports ConAgra.

More sophisticated tracking

The advent of the Universal Product Code (UPC) and computer-assisted checkout systems have allowed supermarkets to track the performance of individual products among other things. Scanning installations have gone from 444 in 1978 to 12,861 in 1985, reports FMI.

Another method retailers use to select which foods to carry is direct product profitability (DPP)—a measure of an individual items's actual profit contribution. While the concept of DPP has been recognized for more than 20 years, computerization has made it more efficient and more accurate. Also, increased competition in the industry has resulted in a growing interest in DPP.

DPP measures a product's adjusted gross margin to reflect such factors as deals and allowances, then identifies and measures costs that are directly attributable to the product, such as labor space, inventory, and transportation costs.

DPP not only assists the in space allocation for frozen food categories, but also directs to the profitability of individual items, Don Rix of Marsh Supermarkets told those in attendance at last October's National Frozen Food Convention. But he also pointed out that, "Manufacturers can help by assisting retailers in giving space to better products, keeping in mind that all in the industry are partners and need to work together to see the most profit."

New technology will continue to result in improved frozen foods and new categories within this area. And modern consumer lifestyles will keep the demand for convenient frozen foods high. All this makes it imperative that those products in the freezer shelves perform well.

As one manufacturer summed it up, "That means that companies better be producing products that consumers want."

FIBRE/CRETE

Now put an epoxy coating on your wall 10 times thicker than ordinary paint ...in one coat.

Fibre/Crete is a high strength, fibre reinforced, chemical resistant, 100% solids epoxy coating that protects floors, walls, ceilings, trenches, containment areas, sumps, tanks, etc.

Extraordinary protection against acids, solvents, fats, caustics, impact and abrasion. Contains no solvents. Withstands structural shifts, bridges hairline cracks, and still remains flexible.

Fast, easy application by brush, roller, spray or trowel. Meets OSHA, USDA, FDA standards.

Call or write for the facts.

COATINGS / COMPOSITES

12923 Cerise Ave., Hawthorne, CA 90250 • (213) 671-8666 • (800) 421-5418
Offices in major U.S. cities; warehouses in Hawthorne, CA, Little Rock, AR and Newark, NJ

Insert 88 on Inquiry Card

BIOTRONA®
Guide Beam Homogenizer

High-turbulence mixer
for quick dissolving,
mixing and homogenizing

For laboratory and industrial applications

COPEK INDUSTRIAL PRODUCTS
10 KEARNEY ROAD
NEEDHAM HEIGHTS, MA 02194
617-449-6335
TELEX 710-325-0441
TELEFAX 617-444-5222

6 USA

Insert 89 or see FEM, p. 210